

Level 3 Certificate in Fire Science, Operations, Fire Safety and Management (All Examinations)

Examiner Report on October 2019 Examinations

Introduction

The majority of candidates performed well in the examinations. As in previous examination sessions, performance was particularly good on the Fire Operations examination and candidates performed least well on the Fire Engineering Science examination.

In order to achieve a pass in these examinations, candidates need to achieve at least 50% of the marks available (ie 25 marks). Candidates who passed the Fire Operations examination often achieved high scores; however, many of the passes in the other subject areas were within a few marks of the pass mark and there were few high scores on these papers.

Fire Engineering Science (L3C1)

General

57% of the candidates who sat this examination were successful in achieving a pass. This pass rate was an improvement on previous examinations. It was noted that many candidates appeared to have prepared well for the examination with fewer candidates omitting questions on topics such as electricity than in previous examinations.

Multiple Choice Questions

Most candidates answered at least seven of the questions correctly.

Candidates generally performed best on the questions that addressed mathematics and geometry, with many able to complete the required calculations correctly. Candidates were most likely to make errors in calculating the capacity of a length of hose.

Questions relating to the section of the syllabus focussed on heat were often answered poorly. Many candidates failed to recognise the description of critical temperature and many failed to realise that an increase in external pressure results in an increase in boiling point.

The questions on chemistry and hydraulics were usually answered well although a surprising number of candidates failed to appreciate that sodium chloride is an example of a compound.

In relation to questions on electricity, few candidates recognised the description of a series circuit.

Short Written Answer Questions

In order to attain marks for this section of the examination, candidates need to present information that is accurate, precise and complete. As in previous examinations, some candidates appeared to guess at answers based solely on their assumption as to the meaning of one or more words within a given term. Candidates must demonstrate technical understanding to secure marks.

Potential Energy and Kinetic Energy: Some candidates confused the terms and therefore did not score marks. Candidates should be aware that potential energy is the amount of energy an object possesses because of its position or the arrangement of its components whereas kinetic energy is the amount of energy an object has by virtue of the fact that it is moving.

Some candidates omitted to provide the required examples or else provided inappropriate examples.

Force: This question was generally answered well with most candidates able to provide the required explanation of the term and then carry out the calculation required. Many candidates achieved all four of the marks available for this question.

Conduction and Convection: Candidates were usually able to provide some basic information about the different types of heat transmission and to secure at least some of the marks available. However, some candidates provided only minimal information and therefore failed to capitalise on the six marks available. Few candidates provided technical information such as the fact that in conduction heat is passed from each molecule to its nearest neighbour with heat moving from high to low temperature regions and no movement of molecules whereas with convection, it is the movement of the liquid or gas molecules through the mass of the fluid which spread the heat energy around.

Water Power: Few candidates achieved high marks for their response to this question. There were many basic errors in relation to the relevant units of measurement in the formula for calculating water power.

Dry Chemical Powders: Candidates often provided basic information about the way in which dry chemical powders work to smother the fire and secured one or two marks; few candidates provided the additional detail needed to secure all of the marks available eg the fact that dry powder forms a crust over metal, deprives it of oxygen, seals it from the atmosphere to isolate the fire and interferes with the chemical reaction.

Most candidates recognised that Ternary Eutectic Chloride powders would be used on flammable metals and were able to provide relevant examples such as magnesium, aluminium or titanium.

Resistance: Candidates who understood how to apply the formula $R=V/I$ were able to secure marks for the calculation required by this question. However, as in previous examinations, many candidates either failed to apply the correct formula or omitted the question completely. Some candidates omitted to include the correct unit (Ohms) in their response and therefore failed to secure the mark available for the use of the correct unit.

Factors affecting the resistance of a circuit: Many candidates were clearly aware of the factors affecting resistance and many were therefore able to achieve all of the marks available for this question.

Potential causes of fire in electrical installations: This question was often answered well although it sometimes appeared that candidates were guessing and some candidates repeated the same point over and over again with minor variations in phrasing. Whilst many candidates referenced maintenance (in various formats) or wear and tear, few referenced causes such as: ignition of flammable gases/vapours/dusts by sparks or heat generated by electrical equipment, ignition of combustible substances by electro-static discharges or mechanical damage.

Fire Operations (L3C2)

General

Standards were extremely high with 94% of candidates achieving a Pass. Candidates generally performed well on both the multiple choice and short answer sections of the paper.

Multiple Choice Questions

There were many good responses to this part of the examination and it was common for candidates to secure 12 or more of the 15 marks available. Questions on incident command and firefighting were answered well by nearly all candidates.

As in previous examinations, the main area of weakness for most candidates appeared to be the operation of equipment. Errors were often made in relation to priming devices, hard suction hose, polyamide ropes and low expansion foam.

Short Written Answer Questions

Candidates also performed well on this part of the examination with most candidates attaining at least half of the marks available. There were no noticeable areas of weakness in terms of knowledge and understanding but sometimes candidates failed to follow instructions or misread questions.

Pre-planning for a possible incident at a building containing a biological hazard: As in previous examinations, many candidates missed/ignored the fact that this question was focussed on pre-planning. Instead of explaining the issues that they would consider when planning, they wrote at length about how they would tackle the incident. This meant that some candidates failed to attain any marks at all for their response to this question. Those candidates who appreciated the context and responded accordingly often secured all four of the marks available.

Cordons: Most candidates secured at least some of the marks available for this question. There were four marks available for this question but some candidates identified only one or two points and therefore lost the opportunity to secure higher marks.

Closing down an incident: some candidates wrote only about the content of a debrief and ignored the requirement to focus on closing down an incident. Only one mark was available for debrief. Examples of other issues that could have been covered include:

- continuing vigilance regarding the hazards that continue to exist or newly emerge
- making appliances and crews available again at the earliest possible time

- ensuring that the responsible person fully understands the hazards and accepts responsibility for ensuring health and safety on the site
- completing relevant reports/documentation

Benefits of ventilation: the benefits of ventilation appeared to be well understood and many candidates articulated them clearly. Many candidates achieved all four of the marks available for this question.

Road traffic incident: The question asked candidates to identify three safety issues and explain the control measures that they would implement to mitigate risks. Many candidates failed to follow the instructions and wrote only about hazards or only about risks. Candidates who took this approach were able to attain only half of the marks available as they had covered only one aspect of the question.

Persons reported in a building on fire: candidates were usually able to obtain at least half of the marks available but some candidates completely omitted to cover points such as confirming where the people were last seen, finding out about the people, entering the building as close as possible to where the people had been last seen, checking around the building and starting firefighting to cover any rescue routes. Many candidates launched into rescue and resources without referring to any initial checks or information gathering.

Salvage operations: this question was focused on actions to prevent damage to goods. Nearly all candidates secured all three of the marks available.

High expansion foam: although some candidates attained full marks, many others failed to achieve any marks at all and some completely omitted to answer the question. Candidates who discussed issues connected to limited projection (throw of jet), slow coverage of large areas, the logistics around foam making equipment, effects of insulations properties or the likelihood of foam breaking up in windy conditions were able to secure all three marks.

BA Guidelines: some candidates failed to realise that the focus of the question was guidelines and wrote about BA equipment rather than focussing on guidelines. Candidates generally recognised the use of guidelines to assist a BA team to locate the scene of operations or to retrace their steps to the BA control point. However, few displayed a deeper understanding and referenced issues such as their use for searching large and complex areas, for entering and searching where high expansion foam is in use and for entering and searching where hoselines are submerged.

Fire Safety (L3C3)

General

64% of candidates achieved a Pass. However, it should be noted that many of the candidates that were successful in the examination scored marks that were only one or two marks above the pass mark. Knowledge was often patchy with candidates scoring marks on only a narrow range of topics.

Multiple Choice Questions

In responding to questions on elements of structure, some candidates failed to recognise that the encasement of steel structural members in fire resistant boards is known as hollow

protection. Candidates also failed to recognise the description of pre-tensioning in the context of reinforced concrete.

Questions on fixed installations were usually answered well. However, few candidates demonstrated understanding that bulk dry power installations are particularly effective on fires involving flammable liquids and gases.

In relation to questions on fire safety practice, many candidates failed to recognise the definition of a place of total safety.

Short Written Answer Questions

Few candidates scored very high marks for this element of the examination. Responses often lacked depth of detail and precision and candidates often appeared to guess at answers – this was particularly evident in responses to the question on total flooding systems.

Sandwich panels: Candidates were asked to describe the structure of sandwich panels and describe the hazards they present in fires. The description provided of sandwich panels was often vague with few candidates able to give a sufficiently precise description of the materials used to score marks. Most candidates did however, recognise the hazards presented (appearing to draw on firefighting experience) and scored well on this element of the question

Factors affecting stability of a brick wall: Most candidates scored at least one mark for the response to this question by referencing the potential for spalling. Few candidates identified other factors such as thickness in relation to height, the effects of any horizontal pushing/levering (ie expansion of steel joists) and the effect of additional loads due to debris/other areas of collapse.

Wet Riser: This question was usually answered well with most candidates able to explain the operation of a wet riser and the contribution to firefighting operations.

Total flooding system: Many candidates failed to attain marks for this question as they started from the assumption that total flooding systems were water-based systems. Candidates should be aware that total flooding systems are gaseous systems (eg CO₂, inert gas, FM200); the media is discharged into an enclosed space in sufficient quantity to produce a concentration able to extinguish a fire throughout that space.

As candidates did not understand the nature of the system, they were unable to identify safety precautions relevant to its activation.

Operating principles of ionisation smoke detectors and optical smoke detectors: This question required technical understanding and precise descriptions. Unfortunately, few candidates were able to provide the required descriptions with most candidates providing only vague statements about smoke getting into the device and triggering the alarm – without the detail related to the components of the detector, this type of statement was insufficient to score marks.

Candidates should be aware that ionisation smoke detectors respond to the invisible products of combustion. The system has an open chamber with a radioactive source. The radiation causes the air to become ionised promoting the flow of electrons between two electrodes. When smoke enters, it interferes with the flow of electricity and causes a reduction in current flow.

An optical smoke detector responds to the visible products of combustion i.e. particles of carbon and other chemicals that give smoke its appearance. This type of detector has a light source and a photo electric cell. Smoke entering chamber affects the amount of light reaching the photo electric cell.

Visual alarm systems: This question was generally answered well and many candidates were able to achieve all three of the marks available.

Refuge: when explaining the purpose of a refuge, candidates often correctly explained that a refuge is a place of reasonable safety in which a disabled person or others who may need assistance may take refuge; however, they often omitted to include the fact that the individuals in the refuge were waiting there on temporary basis until they could be assisted to escape to a place of total safety.

There were four marks available for describing design features. Few candidates achieved all of the marks available. Points which could have been made included:

- it should lead directly to a fire resisting escape route
- it should provide an area accessible to a wheelchair in which a user can await assistance
- it should be enclosed in a fire resisting structure that creates a protected escape route that leads directly to a place of total safety
- further onward evacuation facilities should be provided (evacuation lift, evacuation aids)
- an emergency voice communication (EVC) system or telephone should be provided

Management and Administration (L3C4)

General

89% of candidates passed the examination.

Candidates generally performed better on the multiple choice questions than on the short written-answer questions.

Multiple Choice Questions

Most candidates performed well on the multiple choice element of the paper and nearly all candidates achieved 10 marks or more.

Most candidates appeared to have some understanding of all areas of the syllabus. Some candidates failed to recognise the description of matrix management and others failed to appreciate that delegation is effective when the person delegating the task retains overall responsibility for the outcome of the task.

Short Written Answer Questions

Candidates generally secured at least half of the marks available on this section of the paper.

Benefits of a centralised organisation structure: Some candidates omitted to respond to this question. However, those candidates that tackled the question usually provided good answers and referenced relevant points such as maintenance of coherence, provision of clear

leadership and communication, prevention of silo mentality, tighter budget controls and standardised procedures and services that can result in consistent treatment for customers.

Employer activities with regard to health and safety: This question was usually answered well with most candidates achieving all five of the marks available.

Bureaucratic style of leadership: Some candidates confused the bureaucratic style with the democratic style (and therefore failed to attain marks); some candidates wrote about the autocratic style and sometimes secured one or two marks for the advantages and disadvantages that these two styles of leadership have in common.

Candidates should be aware that the bureaucratic style of management is “by the book/procedure” focussed and ensures that staff follow rules. This style can be rigid in approach. It can be good in high risk situations where it is vital to follow rules (eg in handling toxic substances) and good for organisations in terms of tight risk management. However, it can be frustrating for staff who may feel stifled and therefore it may limit innovation and development.

Motivation of team members: This question was generally answered well. Some candidates created problems for themselves when the points they made were too similar or repetitive to secure more than one mark.

Managing a member of the team performing poorly: This question was usually answered well with candidates identifying relevant points such as discussing the issue with the team member, identifying any underpinning problems, arranging assistance/training, agreeing an action plan with targets and reviewing progress.

Setting up a new record system: This was the least well answered question on the paper with few candidates thinking through the issues to the required level. Candidates needed to identify the factors to be considered and explain why they were important. Examples of points that could have been made included:

- Type of information required e.g. if it relates to personal/HR issues there needs to be a mechanism to ensure that it remains confidential and secure
- Who it is for e.g. if it is general information to be shared, it needs to be easily accessible
- Who will update the system - there needs to be an audit trail to ensure quality of information and the opportunity to check where information has come from

Training needs analysis: This question was generally well answered although some candidates gave repetitive answers so failed to gain full marks.

Advantages and disadvantages of E-learning: this question was usually answered well and candidates often attained full marks.